

Airpower in an Age of Limited War

A Monograph

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Abstract

Airpower in an Age of Limited War, by Lieutenant Colonel Christopher W. Yengo, US Air Force, 42 pages.

The airplane has evolved tremendously since the Wright brothers first took to the air on Kill Devil Hills in 1903, but airpower theory appears largely unchanged. Is that because the early airpower theorists had vision and understanding far beyond the technologies of the day, or is modern airpower primed for a new theorist?

This monograph explores the evolution of airpower theory through the works of Giulio Douhet, Alexander P. de Seversky, Bernard Brodie, and John Warden to trace the progression from the fabric and wood aircraft of World War I to the airborne weaponry of modern times. Finally, the monograph tests contemporary, doctrinally based airpower theory against a recent case study, the 2001-2002 air war in Afghanistan, in accordance with Kenneth Waltz's hypothesis of evaluating theories by explaining past events.

The inquiry concludes that airpower theory, though largely unchanged since the days of Douhet, is sufficient when employed against conventional, state-sanctioned militaries. When used against asymmetric threats and non-state actors, however, the results are much less predictable. Airpower should be used with discretion. It is not a one-size-fits-all panacea to every military problem, and if the last fifteen years are any indication, perhaps it should be used much less.

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Acronyms

CENTCOM	US Central Command
GPS	Global Positioning System
JTAC	Joint Terminal Attack Controllers
ODA	Operational Detachment-Alpha
OEF	Operation Enduring Freedom
PGM	Precision Guided Munitions
RAND	Research AND Development Corporation
RAF	Royal Air Force
SAASS	School of Advanced Air and Space Studies
SOF	Special Operations Forces

Introduction

By making effective use of the third dimension, the electromagnetic spectrum, and time, airpower can seize the initiative, set the terms of battle, establish a dominant tempo of operations, better anticipate the enemy through superior observation, and take advantage of tactical, operational, and strategic opportunities. Thus, airpower can simultaneously strike directly at the adversary's centers of gravity, vital centers, critical vulnerabilities, and strategy.

—US Air Force Core Doctrine: *Volume 1, Basic Doctrine*

Military aviation is not new. The first use of aircraft in combat preceded the Wright brothers' successes at Kitty Hawk by 109 years when the French formed a balloon detachment and debuted *L'Entreprenant* in 1794 at the Battle of Fleurus. *L'Entreprenant*, an aerostat modified for battlefield surveillance, was manned by a crew of two observers and was capable of staying aloft for nine hours. This simple balloon introduced the military commander to the third dimension of the battlespace and eventually changed armed conflict forever.¹

Airpower's contributions to war and warfare now span more than 220 years. On the surface, airpower has evolved immensely. Conventional, heavier-than-air flying machines quickly surpassed the lighter-than-air balloons of the Napoleonic age that ruled the first half of airpower's existence. The rickety, cloth-covered wooden structures of the early 1900s gave way to supersonic jets in less than half a century, and the technological progress that followed presently equips the US Air Force with speed, precision, and efficiency hardly imaginable to the first airpower theorists of the early twentieth century, let alone the Montgolfier brothers of pre-revolutionary France.

Surprisingly, however, those early airpower theorists would likely understand and agree with most of the contents of *Volume 1, Basic Doctrine* of the US Air Force's Core Doctrine. Airpower theory appears timeless despite unprecedented advancements in aerospace technology.

¹ Andrew G.B. Vallance, *The Air Weapon: Doctrines of Air Power Strategy and Operational Art* (New York: St. Martin's Press, 1996), 1-2.

Is that because the foundation of airpower theory is unchanging and was fully evolved shortly after its inception, or is it because the evolution of airpower theory has lagged behind evolving capabilities? Alternatively, does airpower theory even warrant a category of its own right? Is airpower theory simply a different flavor of Carl von Clausewitz's timeless theory of war presented over 200 years ago, or is it unique unto itself?

The answers to these questions are not clear, but serve to highlight a general intellectual shortfall among aviators. Sebastian Cox, a well-known author on airpower and the head of the Historical Branch of the Royal Air Force (RAF) argues, "In the realm of military theory, airmen have always tended to be less prolific than their army or naval counterparts."² For perhaps a variety of reasons outside the scope of this paper, an airman's skill in the cockpit has typically held more influence over his or her career than intellectual prowess. The discussions and debates concerning theory, history, and doctrine common in the US Army seem to be atypical amongst US Air Force professionals. That discrepancy may explain some of the confusion and ambiguity concerning modern airpower theory, but at the very least, it highlights a deficiency in at least a portion of the officer corps. Perhaps those individuals may be enriched, to some small degree, by the content of this monograph.

Context

The US Air Force has a clear, undisputed requirement for high quality pilots, but high quality thinkers are important, too. An understanding of airpower theory, from the perspective of a military leader, goes hand in hand with the tactical competency of flying an aircraft and employing a weapon system. Everett Dolman, Professor of Strategy at the School of Advanced Air and Space Studies, agrees with the symbiotic relationship between intellect and skill, stating,

² Sebastian Cox, ed., *Airwar: Theory and Practice* (London: Frank Cass Publishers, 2003), ix.

“Theory shapes our perceptions of the world and experience hones our ability to interact in it.”³

An appreciation and understanding of airpower theory goes hand in hand with the tactical proficiency of employing airpower.

A clear, consistent understanding of current airpower theory is elusive. This monograph does not try to conclusively define or evaluate current airpower theory, but seeks to evaluate airpower’s performance in a recent conflict based on an estimation of modern theory compiled from a sampling of writings from theorists throughout the past century.

Methodology

A basic introduction to the terminology and vernacular of the philosophy of war and warfare is foundational to this monograph. With the terms defined, this monograph will explore the history of airpower theory within the context of the established definition. The history will be divided into four case studies focusing on individual airpower theorists: early airpower theory, interwar years, the Cold War, and limited war. Finally, this monograph will attempt to articulate a contemporary airpower theory and apply it to the initial phases of Operation Enduring Freedom to evaluate its validity using a method outlined by Kenneth N. Waltz in a 1997 *American Political Science Review* article titled “Evaluating Theories.”⁴

Waltz was a contemporary philosopher who specialized in international relations theory. The author of several books, including *Man, the State, and War* and *Theory of International Politics*, Waltz analyzed the causes of war, and he also coined the term “neorealism,” which attempts to explain the interactions of sovereign states. Waltz’s article, “Evaluating Theories,” assesses several methods of weighing the value of different international models. His essential claim is that theories should not be considered predictive, but rather explanative. “Success in

³ Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Frank Cass, 2005), 188.

⁴ Kenneth N. Waltz, “Evaluating Theories,” *American Political Science Review* 91, no. 4 (December 1997): 916.

explaining, not in predicting, is the ultimate criterion of good theory,” he concluded.⁵ In other words, a theory’s validity can be determined by applying that theory to a historical example it was designed to explain.

There are many challenges associated with validating theories, not the least of which is the element of personal perception. Waltz explained that the success of a validation test “depends as much on how one interprets the theory as on what happened.”⁶ The challenges to this monograph are clear and formidable: the substance of contemporary airpower theory needs to be extracted from a historical study of prominent airpower theorists, and those theories, according to Waltz’s model, must capture the success or failure of the early phases of Operation Enduring Freedom.

With respect to the overarching theories of war and warfare, much of the confusion surrounding airpower theory stems from an ambiguous understanding of the terminology. Differences between the terms “theory” and “strategy” can be subtle and have a tendency to distract the military scholar. While related, the terms are not synonymous, though they are sometimes used interchangeably in contemporary writings by non-military authors, and the definitions themselves have evolved over time.

According to James Rosenau, a political scientist and international affairs scholar, theory constitutes “a set of predispositions, a cluster of habits, a way of thinking, a mental lifestyle... that level of intellectual existence that governs the use of skills and the application of values.”⁷ Airpower theory, then, can be inferred to be the body of information and principles used to guide the employment of airpower. Furthermore, Joint Publication 3-0 defines strategy as “a prudent idea or set of ideas for employing the instruments of national power in a synchronized and

⁵ Waltz, “Evaluating Theories,” 916.

⁶ Ibid.

⁷ James N. Rosenau, *The Scientific Study of Foreign Policy* (London: Frances Pinter, 1980), 19.

integrated fashion to achieve theater, national, and/or multinational objectives.”⁸ This is similar to the previous definition of theory, but encompasses a more holistic approach to national objectives. Theory and strategy are directly related, in that airpower theory has historically led to developments or refinements of military strategy.⁹

Analysis

Airpower theorists have been around since the airplane’s earliest appearance on the battlefield. Interestingly, the world’s militaries did not immediately appreciate airpower, and countries incorporated the capability in vastly different ways in the early twentieth century. European powers were generally quick to embrace the new technology, but acceptance in the American Army came at a much slower pace. US Army Captain Benjamin D. Foulois of the Army Signal Corps made US military history in 1916 when he commanded heavier-than-air aircraft in combat for the first time in an ill-fated attempt to track down and capture Pancho Villa. Foulois’ First Aero Squadron consisted of eight JN-3 biplanes, and while primitive and simple in nature, these aircraft represented a unique capability to traverse and reconnoiter the rugged, unimproved terrain of northern Mexico.¹⁰

While a first for American combat aviation, it was not airpower’s most favorable start. US Army Brigadier General John J. Pershing, commander of the Punitive Expedition, did not oppose the new technology, but found much more utility in the fleet of trucks used to transport the aircraft from San Antonio than the unreliable, ill-performing aircraft themselves.¹¹ Tactics, training, and procedures were also lacking, but World War I dramatically accelerated America’s

⁸ Joint Publication (JP) 3-0, *Joint Operations* (Washington, DC: Government Printing Office, 2011), GL-16.

⁹ Jeffrey J. Smith, “Beyond the Horizon: Developing Future Airpower Strategy,” *Strategic Studies Quarterly* 8, no. 2 (Summer 2014): 76.

¹⁰ John D. Eisenhower, *Intervention: The United States and the Mexican Revolution, 1913-1917* (New York: W.W. Norton & Company, 1993), 239-240.

¹¹ Ibid.

development of this new technology as the United States scrambled to catch up to its European allies and adversaries.

The experiences of the World War I produced a generation of cocksure, flamboyant airpower theorists on both sides of the Atlantic and, consequently, the use of airpower in the next world war dramatically reshaped the battlefield. Two great by-products of World War II—the independent US Air Force and the nuclear bomb—further influenced airpower theory. The ensuing Cold War had the potential to drastically simplify airpower theory but for the emergence of limited wars in Korea, Vietnam, and other places. To further complicate the evolution of airpower theory, in recent years military powers used airpower extensively against non-state actors bereft of any type of air force at all, and in some cases with unmanned, remotely piloted aircraft.

This historical analysis will examine theorists from the past century, primarily through the theorists' writings, to distill and codify the prevalent theories of the day as the airplane evolved from its infant state following the Wright Brothers' successes at Kitty Hawk, North Carolina, to the present.

The Early Days: Giulio Douhet

The Italian artillery officer Giulio Douhet is often considered the father of airpower theory. Born in 1869, he graduated first in his class from the Genoa Military Academy and built a solid reputation as a competent, professional officer with a bent for technical aptitude. He wrote extensively during the early part of the twentieth century and influenced military powers across the globe.¹² The primary themes in his airpower theory emerged in his book, *The Command of the Air*. The themes consisted of an independent air force commanded by airmen, and the importance of strategic bombers exercising a first-strike capability. This first-strike capability enabled a

¹² Phillip S. Meilinger, "Giulio Douhet and the Origins of Airpower Theory," in *The Paths of Heaven: The Evolution of Airpower Theory*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997), 1-3.

country to destroy the enemy's air force before it was able to leave the ground and take command of the sky, permitting direct attacks against civilian populations to break the enemy's will to fight.¹³

Douhet's prolific writing began when, as a captain, he served on the Italian army's general staff. He wrote several papers advocating the use of mechanization, including "Mechanization from the Point of View of the Military" and "Heavy and Military Mechanization." He saw technology as a force multiplier for Italy's manpower and resource-deprived military, a concern that would surface again in his later writings. Douhet's zeal for airpower began in 1905 when Italy built its first dirigible. He gained an immediate appreciation for what he interpreted as a revolution in military technology. When Italy's first airplane flew in 1908, the topic of aviation began to consume much of his time. The significance of the airplane was not universally understood in the Italian Army, and Douhet's fanaticism began to cause him trouble. While notably not a pilot, Douhet insisted that command of aircraft should be left to airmen.¹⁴

In 1911, Italy's airplanes saw combat for the first time in the war against Turkey for control of Libya. This was not only Italy's first use of airplanes in combat, but the first use ever of airplanes in combat. The scope of use was astounding. As airpower author Phillip Meilinger noted, "amazingly, aircraft were used not only for reconnaissance but also for artillery spotting, transportation of supplies and personnel, and even bombing of enemy troops, supplies, and facilities, both day and night. In short, most of the traditional roles of airpower employment were identified and attempted."¹⁵ While the 1911 war with Turkey was not particularly fruitful for the Italians, and airpower proved ineffective, the conflict provided Douhet with a point of reference rooted in concrete experience to build on in his writing.

¹³ Giulio Douhet, *The Command of the Air*, 2nd ed., trans. Dino Ferrari (New York, NY: Coward-McCann, 1942), 1-20.

¹⁴ Meilinger, "Giulio Douhet and the Origins of Airpower Theory," 2.

¹⁵ *Ibid.*, 3.

In 1912, Douhet took command of the Italian aviation battalion and wrote one of the first manuals for the employment of airpower entitled “Rules for the Use of Airplanes in War.”¹⁶ Despite this early effort at airpower doctrine, the Italian army was ill prepared for real hostilities. Douhet wrote explosive letters to his supervisors and even several government officials expressing his opinions on the potential use of airpower and the generally poor Italian conduct of the war. He was twice reprimanded for his criticism and ultimately arrested and court-martialed for unprofessionalism. In 1916-17, he spent a year imprisoned at the fortress of Fenestrelle where he continued writing, championing an airpower revolution as the Italian army continued to struggle, culminating in the Battle of Caporetto where the Italian army suffered a crushing defeat and massive casualties.¹⁷

Douhet left the military amidst the turmoil created by his sharp opinions on the use of aircraft and continued to pursue his literary agenda. In 1921, he published *The Command of the Air* and revised it in 1927. In the original edition, he made the case for coordination of the army, navy, and air force under a unified command, and extolled the virtues of a separate and independent air force. The Italian military largely incorporated the recommendations concerning an independent air force by the release of the second edition. Consequently, the 1927 edition focused on the actual implementation of airpower, which is the focus of this case study. In Douhet’s words, “The ideas expressed in this second part will seem daring, perhaps strange, but I am certain that they too will make their way and finally be accepted like the others. It is only a question of time.”¹⁸

Douhet’s airpower theory was, to say the least, daring and strange. His theory centered upon independent offensive missions, something the major players in World War I were never

¹⁶ Meilinger, “Giulio Douhet and the Origins of Airpower Theory,” 4.

¹⁷ Ibid., 6-7.

¹⁸ Douhet, *The Command of the Air*, xi-ii.

quite able to figure out.¹⁹ He also understood the significance of technology in warfare and recognized the revolution represented by the airplane. Directly related to the airplane was another new technology: poison gas. “These two weapons complement each other... Air power makes it possible not only to make high-explosive bombing raids over any sector of the enemy’s territory, but also to ravage his whole country by chemical and bacteriological warfare.”²⁰ Douhet understood how these two technologies, ordnance and delivery vehicle, could revolutionize warfare. Though air forces were reluctant to use poison gas after World War I, his theories transferred well to the use of an even more devastating type of ordnance during the next world war.

Douhet also argued that offensive attacks should ultimately be directed at civilian population centers. It is important to understand Douhet’s assumption that all future wars would be total wars: “...all of their citizens will become combatants, since all of them will be exposed to the aerial offensives of the enemy. There will be no distinction any longer between soldiers and civilians.”²¹ The scale and severity of World War I clearly had a profound impact on Douhet and the population of Europe in general. He favored anything that promised to shorten the next conflict. It should also be noted that World War I battle damage assessments often admitted to a limited amount of physical damage, but the impact on German morale were thought to be unlimited.²² Presumably, this shaped much of Douhet’s philosophy with regard to civilians: “The outcome of the last war was only apparently brought about by military operations. In actual fact,

¹⁹ Douhet, *The Command of the Air*, 4.

²⁰ Ibid., 6-7.

²¹ Ibid., 10.

²² Tammi Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2004), 96.

it was decided by the breakdown of morale among the defeated peoples—a moral collapse caused by the long attrition of the people involved in the struggle.”²³

The offensive strike was foundational to Douhet’s airpower theory. The third dimension of the battlefield was important because it allowed an air-wielding nation to overfly enemy forces and strike targets without warning, but of course, an enemy with similar capabilities could do the same. Douhet’s solution was to strike first and destroy the enemy air force on the ground:

“...there is no practical way to prevent the enemy from attacking us with his air force except to destroy his air power before he has a chance to strike at us.”²⁴ In other words, the only defense was a good offense.²⁵

As with all airpower theorists, targeting methodology was fundamental to Douhet’s views. Contemporary airpower enthusiasts pay much attention to his acceptance and even encouragement of the targeting of civilians, but in *The Command of the Air*, very few references were made that support that facet of his theory, and they are accompanied by very little explanation. It was apparently not as important to Douhet as some scholars assume. More significant to his theory is his explanation of target selection. The core of Douhet’s ideal air force is the bomber, and he contended that it should first be used to gain command of the air. He noted, “I have always maintained that the essential purpose of an air force is to conquer the command of the air by first wiping out the enemy’s air forces.”²⁶ Freedom of maneuver through the air was a prerequisite, and only one side could enjoy it during a war, which reinforced Douhet’s views that

²³ Douhet, *The Command of the Air*, 126.

²⁴ Ibid., 16-18.

²⁵ An interesting discontinuity appears when Douhet discusses the structure of the Independent Air Force in Chapter II of *The Command of the Air*. He proclaims that the air force should have both bombers and pursuit squadrons: “the first to direct offensive action against surface targets, the second to protect the bombers against possible enemy opposition.” Why would Douhet think the pursuit squadrons were necessary if an air attack was indefensible? There are several questions with Douhet’s logic, but unfortunately, they lie outside the scope of this monograph. Ibid., 34.

²⁶ Ibid., 50-51.

to be successful, a country needed to attack first and eliminate the enemy air threat. Douhet firmly believed that a successful defense against airpower was unlikely, if not impossible.²⁷

Beyond the enemy's air force, Douhet's discussion of target selection was relatively limited. He wrote, "In general, aerial offensives will be directed against such targets as peacetime industrial and commercial establishments; important buildings, private and public; transportation arteries and centers; and certain designated areas of civilian population as well."²⁸ Douhet qualified the generalities of his examples with the challenges faced when measuring the importance of specific targets: "It is impossible even to outline general standards, because the choice of enemy targets will depend upon a number of circumstances, material, moral, and psychological, the importance of which, though real, is not easily estimated."²⁹ He notably left the topic of target selection to future air force commanders, and highlighted it as an area for them to "show their ability."³⁰ The theme that resonates through the writings of Douhet is the idea of "vital centers." He discussed them in terms of their importance to the enemy as well as their importance to friendly countries (in relation to defense), but conspicuously avoided defining them with any clarity. That said, his imprecise use of the term became convenient for future theorists who drew parallels to Carl von Clausewitz's idea of a center of gravity, or "the hub of all power and movement, on which everything depends."³¹

Related to his targeting philosophy is Douhet's discussion and assumptions with respect to bombing efficiency. Bombing techniques and equipment evolved significantly during World War I and, by the time of Douhet's writing, those activities seemed to be enjoying a state of maturity. Consequently, Douhet's airpower theory hinged on mathematical assumptions of the

²⁷ Douhet, *The Command of the Air*, 52.

²⁸ Ibid., 20.

²⁹ Ibid., 59-60.

³⁰ Ibid., 60.

³¹ Carl von Clausewitz, *On War*, ed. and trans. by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 595.

potential destructive capability of the bomber. Douhet assumed that a flight of bombers could carry a certain amount of ordnance, and that, if dropped from a specific altitude, would be able to destroy everything within a circle of a specific radius (a flight of 10 bombers carrying 1,000 kilograms of bombs dropped from 3,000 meters would destroy everything within a circle 500 meters in diameter).³² This simplistic calculation underscored Douhet's requirement for massive numbers of bombers and highlighted his affinity for large, identifiable targets: "Bombing objectives should always be large; small targets are unimportant and do not merit our attention here."³³

In summary, an early offensive strike conducted by an independent air force to destroy the enemy's air force and gain command of the air underpinned Douhet's airpower theory. This would allow the freedom of maneuver required to attack enemy vital centers and directly reduce the enemy population's will to fight. The ordnance should include explosives, incendiaries, and poisonous gases. Douhet reasoned that defenses against airpower were insignificant and he fetishized the offensive.

The conditions for the formulation of Douhet's airpower theory were simple: airplanes were in their infancy and there was nothing in place to guide their employment. The Italians saw the use of airpower in the Turkish war of 1911 and then, of course, World War I, but while these conflicts accelerated the development of aviation hardware, the wartime environment was not ideal for developing theory. As he explained, "now that we are released from the pressure of the World War, with its trial-and-error methods, it behooves us to work toward the solution of this problem by an entirely different method, one calculated to obtain for us the maximum return with the minimum effort."³⁴ Douhet is often considered the pioneer of airpower theory because of his advocacy prior and during World War I, but his most influential writings occurred during the

³² Douhet, *The Command of the Air*, 50.

³³ Ibid., 20.

³⁴ Ibid., 5.

interwar period: "...we must be convinced that the experience of the World War can serve only as a point of departure—a point already left far behind us. It cannot serve as a basis for the preparation of national defense, a preparation which must be undertaken with an eye to the necessities of the future."³⁵

The Second World War: Alexander P. de Seversky

Giulio Douhet did the majority of his writing after the hostilities of World War I ceased, but airpower theorists studied his works at length during the interwar years and they heavily influenced the world's air forces by the dawn of World War II. Sir Hugh Trenchard, the RAF's Chief of Air Staff and General Billy Mitchell, Assistant Chief of the US Air Service, both shared Douhet's sanguine belief that the air force could render the bloody trench warfare of World War I obsolete. They also believed the air force should be an independent service and that strategic bombing was an essential core capability of airpower.³⁶ Germany also subscribed to Douhet's theories and the early days of World War II witnessed a bombing campaign against London with the clear objective of attacking British morale. The notion that an airborne bombing attack was indefensible and that the civilian will to fight could quickly be destroyed were both brought into question.³⁷ In 1942, Alexander P. de Seversky, a Russian-borne American inventor and theorist, published a book titled *Victory Through Air Power* that took a more refined view of airpower theory.

In 1894, Seversky was born in Tiflis, Russia and he graduated from the Imperial Russian Naval Academy in 1914. After a few months of sea duty on a destroyer, he transferred to the Navy's flying service. He was shot down by antiaircraft fire on his first mission and lost his right

³⁵ Douhet, *The Command of the Air*, 7.

³⁶ Vallance, *The Air Weapon*, 7-8.

³⁷ Phillip S. Meilinger, "Proselytiser and Prophet: Alexander P. de Seversky and American Airpower," in *Airpower: Theory and Practice*, ed. John Gooch (London: Frank Cass & Co Ltd, 1995), 14-17.

leg below the knee. This instance of a successful ground-based attack against an aircraft had a profound affect on Seversky and likely contributed to his departure from Douhet's theories later on.³⁸

Fitted with a wooden leg, he ultimately made his way back into a cockpit and went on to fly fifty-seven more combat missions, scoring thirteen kills on the eastern front. In 1917, he was sent to the United States as a liaison to the Russian naval mission and, when the Bolshevik government came to power shortly after, his mission dissolved and he elected to remain in the United States. In 1927, he received a commission as a major in the US Air Corps Reserves. Four years later, he founded the Seversky Aircraft Corporation where he designed and produced several unique aircraft throughout the 1930s. Seversky's management of the company and his relationship with the Army were both less than ideal, and in the spring of 1939 the board of directors removed him outright from the company he founded. His most lasting impact on aviation was yet to come: his prolific writings on airpower.³⁹

Seversky's theories on airpower were not entirely original, but he contributed significantly to the growing body of knowledge. First, as a civilian, and unlike Douhet and Mitchell, his views were not muffled by military superiors. He also benefitted from the well-established reputation he earned within the aeronautical community as a leading designer and manufacturer of modern military aircraft. He was well respected because of his experience and accomplishments, but he was also familiar with the design limitations and operational constraints of modern aircraft. This level of insight was central to the balanced value of his writings.⁴⁰ Finally, he had the benefit of analyzing several years of the European theater of World War II before he wrote *Victory Through Air Power*. Significantly, Seversky directed his writings not just at military professionals but also the American populace. His prose was simple, clear, and

³⁸ Meilinger, "Proselytiser and Prophet," 14-17.

³⁹ Ibid.

⁴⁰ Ibid., 12.

entertaining. In support of this, much of *Victory Through Air Power* rehashed articles he had published in such non-technical publications as *American Mercury*, *The Atlantic Monthly*, *The American Magazine*, *Flying and Popular Aviation*, *Look*, *Coronet*, *Reader's Digest*, and *Town and Country*. His writings were so mainstream that *Victory Through Air Power* earned inclusion in the popular Book-of-the-Month Club.⁴¹ Seversky's first book on airpower also attracted a large amount of public attention through the Walt Disney film by the same name.

Countless millions viewed Seversky's film and it contributed significantly to his popularity. Additionally, the film's animated and educational nature attracted a diverse and impressionable audience. The film began with an entertaining history of heavier than air flight but quickly transitioned to the horrors of World War II and the devastating successes of the *Luftwaffe* in the European theater. The visual depiction of the reach and destructive capacity of airpower broadened his influence beyond just the literary audience enjoyed by many theorists.⁴² The film is most noteworthy today as an example of American propaganda, but the film also fostered support for airpower and helped make Seversky a national figure.

The motivation for Seversky's theorizing stemmed, at least partially, from a profound sense of national pride. He wrote, "A realistic understanding of the new weapon, of its implications in terms of national security, of its challenge to America, is not a matter of choice. It is the very condition of national survival."⁴³ Seversky was appalled about the Pearl Harbor attack and blamed it entirely on the lack of preparation by military and government leadership. "The terrific danger was exposed for all to see. That initial week shocked the American people even as the French people had been shocked when German aviation and Panzer divisions ignored their

⁴¹ Meilinger, "Proselytiser and Prophet," Introduction.

⁴² *Victory Through Air Power*, directed by Perce Pearce (Walt Disney Films, 1943), accessed October 18, 2016, <https://www.youtube.com/watch?v=tUeKeN9bXSE>.

⁴³ Alexander P. De Seversky, *Victory Through Air Power* (New York, NY: Simon and Schuster, 1942), 3.

Maginot Line,” he explained.⁴⁴ In his view, American airpower was no match for German and Japanese airpower, and he made it his mission to educate the American populous as a way of influencing policy. He continued: “I want to focus attention on the new principles of warfare shaped by the emergence of military aviation and demonstrated by the experience of the present war.”⁴⁵

Seversky’s relationship with the Army Air Corps also influenced his perspective. As a pilot, an aeronautical engineer, and ultimately a manufacturer of military aircraft in the 1930s, Seversky forged a close relationship with many high ranking military officers, including General Billy Mitchell and General Hap Arnold. Mitchell was perhaps the United States’ loudest proponent of airpower during the interwar years, and he shared many ideas on the use and value of airpower with Seversky. They were also friends, and of such a close nature, that Seversky even dedicated his book to Mitchell’s memory.⁴⁶ Mitchell was boisterous and insatiable in his views, and he was ultimately court martialed and forced out of the service for his insubordination and unprofessionalism. Seversky believed in Mitchell’s cause. After Mitchell’s death in 1936, Seversky inherited the tasks of both advocating for the role of aviation amongst the American population and fighting the bureaucracy within the Army and Navy, whose parochial interests kept aviation from achieving prominence within the military. In Seversky’s words, “the court-martial of General Mitchell was not soft-pedaled. On the contrary, it was staged and dramatized so that its moral would register with other ‘troublemakers’ who might insist on talking on aviation.”⁴⁷

At the other end of the spectrum, Seversky loathed Arnold, Chief of the Air Corps. This disdain may have stemmed from Arnold’s role in Seversky’s removal from control of the

⁴⁴ Seversky, *Victory Through Air Power*, 4.

⁴⁵ Ibid., 5.

⁴⁶ Ibid., Preface.

⁴⁷ Ibid., 221.

Seversky Corporation in 1939. Arnold foresaw the need for a massive increase in the manufacturing capability of the United States and, if the Seversky Corporation was going to play a role, he believed it required a reorganization of senior management. This infuriated Seversky, but as good as he was at designing and manufacturing aircraft, his service to the United States was greater as a public proponent of airpower. Unfortunately, his distaste for Arnold was evident in his writings, and he alienated some of the very same leaders in the US military who were important to his cause.⁴⁸

Seversky believed, like Douhet and Mitchell, that airpower constituted the preeminent form of warfare and that it could only be used effectively if it were under its own control. He saw the inherent wastes associated with airpower capability developed and executed independently within the bureaucracy of the Army, Navy, and even Marines. More specifically, however, he understood the potential efficiencies that accompanied the establishment of a separate and independent air service: “The unnatural segmentation of our air forces is at present too often a source of misunderstanding and jurisdictional competition between the Army and the Navy. The elimination of this anachronistic issue should help to make these two services and the third independent service a team of three, with confidence in themselves and in on another.”⁴⁹

Similar to Douhet, Seversky believed the third dimension of the battlefield allowed a friendly air force to overfly the enemy’s conventional forces and attack key infrastructure at the outset. When referring to Nazi Germany’s massive industrial complex feeding interior lines to the front, he illustrated the airplane’s advantage: “Airpower ignores the battlefronts...by direct and independent action, it strikes at the hub.” With an appreciation for the Allied ground forces, he

⁴⁸ Meilinger, “Proselytiser and Prophet,” 11-12.

⁴⁹ Seversky, *Victory Through Air Power*, 293.

goes on to explain how the destruction of the German ground forces will then be possible once its steady resupply capability is destroyed.⁵⁰

This relationship highlighted another difference between the theories of Douhet and Seversky. Wherein Douhet continually underscored the importance of command of the air to enable air operations, Seversky emphasized the value of air superiority for ground operations. During the interwar years, the value of airpower as a strategic capability received wide attention, but Seversky acknowledged its use as a tactical enabler of ground and sea forces. The German integration of air and land components during the invasion of Poland in 1939 was a clear example of effective integration. It helped, however, that Poland had a weak air force and practically no air defenses. The German army was able to operate with impunity. With the same army supported by the same *Luftwaffe*, Germany, up to a point, achieved equal success in their push westward in 1940. When the front reached the umbrella of support provided by the RAF based on the other side of the English Channel, the *Luftwaffe's* luck changed. As Seversky put it, "here the Spitfires and Hurricanes could function. Because of their qualitative edge, in fact, they could dispute and conquer the air over the Channel as well as a segment of Flanders against the numerically superior German aircraft. The 'miracle of Dunkirk' was essentially a miracle of modern aviation."⁵¹ The British Navy also played a role in the massive evacuation of Allied troops, but local air superiority carried the day. In June 1940, Seversky prepared an analysis on this topic for the United Press, comparing the loss suffered by the British in the absence of air superiority at Norway's Skagerrak Strait to the victory over the English Channel. He stated, "The deductions went against the grain of their accustomed ideas on the subject."⁵² Fortunately, one influential

⁵⁰ Because the film was produced a year after the book was written, many of Seversky's World War II examples are better illustrated by the film due to the ongoing conflicts in Europe and the Pacific. *Victory Through Air Power*, directed by Perce Pearce (Walt Disney Films, 1943), accessed October 18, 2016, <https://www.youtube.com/watch?v=tUeKeN9bXSE>.

⁵¹ Seversky, *Victory Through Air Power*, 38-40.

⁵² Ibid.

Englishman, Prime Minister Winston Churchill, agreed with Seversky's assessment, and the forthcoming Battle of Britain converted many others.

Seversky used the Battle of Britain to illustrate several points, not the least of which is the impact of an air force designed and employed exclusively to support a ground force.⁵³ The Luftwaffe's core airframe, the Junkers 87, was a short-range, light attack aircraft that excelled in upsetting the enemy enough to allow the *Blitzkrieg* style penetration and envelopment. When operating on its own over heavily defended enemy territory, the results were much different. The Junkers was no match for the faster, more maneuverable, and better-armed fighters of the RAF.⁵⁴

Seversky believed aircraft needed to be purpose-built. Planes constructed to support ground troops, like the Junkers 87, would likely not fare well in aerial combat with the British Spitfire, and likewise, aircraft designed for defensive roles like the Spitfire would not have the necessary attributes to be successful in strategic bombing. In a pointed divergence from Douhet, Seversky acknowledged the impossibility of the battleplane: a platform integrating both combat power and bombing capability. "In practice, this cannot be achieved," he wrote.⁵⁵ Seversky was not claiming that bombers should be completely absent of self-defense, or that fighters should not be built with any sort of bombing capability. Rather, his experience in aircraft operations and design credibly supported the position that aircraft should be intentionally designed for the role in which they were to be implemented.

The Battle of Britain supported another important divergence from Douhet's theory: that airpower is indefensible. Douhet's recommendation for destroying an enemy air force was to attack it on the ground, but the Battle of Britain demonstrated that superior aircraft performance, along with the advent of radar, could enable a sustainable defense. Seversky claimed "German

⁵³ It should be noted that the Luftwaffe was "a distinctly separate and autonomous military service, on a basis of full equality with the German Army and Navy," but it was controlled by the High Command to answer the tactical demands of ground operations. Its organization did not meet the intent of an independent air force as outlined by Seversky and others. Seversky, *Victory Through Air Power*, 45.

⁵⁴ Ibid., 44-45.

⁵⁵ Ibid., 312.

failure over England was not a failure of air power but of German vision-a failure to exploit fully potentialities of the new weapon already in existence.”⁵⁶ It appears that Seversky believed that the *Luftwaffe* could have been successful if its planes were equipped with the same caliber of aircraft enjoyed by the British. Parity of forces, as we shall see, is something airpower theorists rarely consider.

Finally, the Battle of Britain also demonstrated the population’s potential resilience to direct attack from the air. As previously discussed, Douhet theorized a rapid capitulation of the population’s will to fight in the face of overwhelming air strikes, but Britain’s resolve in the early 1940s challenged that assumption. “It had been generally assumed that aerial bombardment would quickly shatter popular morale, causing deep civilian reactions, possibly even nervous derangements on a disastrous scale. The progress of this war has tended to indicate that this expectation was unfounded,” he added.⁵⁷ Seversky’s response to this realization was precision bombing. The military results from haphazard targeting of population centers simply did not justify its costs in manpower and resources. “On the whole, indeed, armed forces have been more quickly demoralized by air power than the unarmed city dwellers,” he wrote.⁵⁸ Seversky’s opinions on this matter appear to have shaped policy as the US Army Air Corps made the difficult decision to pursue precision daylight bombing over heavily defended Germany.⁵⁹

Seversky also criticized the apparent inferiority of the Navy’s ship-based planes when compared to the larger, more capable land-based aircraft of the day. His argument rested on the significantly smaller size of naval aircraft due to the size of the aircraft carriers themselves.

⁵⁶ Seversky, *Victory Through Air Power*, 70.

⁵⁷ *Ibid.*, 145.

⁵⁸ Seversky goes on to say in parentheses: “Of course, if populations are wiped out substantially or entirely, the game is up; we are dealing with large-scale destruction far short of such extremes.” In a few short years, the extremes of which he speaks are realized with the implementation of nuclear warfare on mainland Japan. That will be discussed later. The focus of this case study is the period of warfare preceding nuclear capability. *Ibid.*

⁵⁹ W. Hays Parks, “‘Precision’ and ‘Area’ Bombing: Who Did Which, and When?” in *Airpower: Theory and Practice*, ed. John Gooch (London: Frank Cass & Co Ltd, 1995), 145-146.

Smaller aircraft equate to shorter range and smaller bomb loads. This was a particularly relevant discussion during World War II when the Allies grappled with the eventual air attack on mainland Japan. Due to these assumptions, a successful sea-based airstrike on Japan would require not hundreds, but thousands of carriers.⁶⁰ This important criticism held true at the time, but technical advancements in catapult-assisted launches and air refueling have since increased the capabilities of naval aviation.

As inferior as naval aircraft were in the opening days of World War II, Seversky emphasized the effectiveness of the Japanese naval aircraft in sinking America's capital ships at Pearl Harbor. While sea power proponents dismissed the event as a sneak-attack conducted against a nation at peace, they had a harder time excusing the loss of the British battleships *Prince of Whales* and the *Repulse* just three days later while on high alert. These ships were, in Seversky's words, "the most modern type—the type which our experts assured us was 'unsinkable'"⁶¹ He uses this example to reinforce his position that the navies of the world were becoming less relevant. In the chapter entitled "The Twilight of Sea Power," Seversky declared: "For centuries on of the principal jobs of navies was to carry the conflict to the enemy... Now that job has been taken over by air power."⁶² Seversky echoed much of what Douhet and Mitchell proclaimed, but supported it with examples from the recent conflicts of World War II: "Within a few weeks after the attack on Hawaii, the Pacific floor was littered with Allied and Japanese warships—all but a few of them killed off by airplanes... Neither sea forces nor ground forces could turn off invasions launched under the shield of superior aviation."⁶³

Seversky's works on airpower were unique because he did not limit his theories to the technology available at the time. With war raging in Europe and the Pacific, much of his analysis

⁶⁰ *Victory Through Air Power*, directed by Perce Pearce (Walt Disney Films, 1943), accessed October 18, 2016, <https://www.youtube.com/watch?v=tUeKeN9bXSE>.

⁶¹ Seversky, *Victory Through Air Power*, 168.

⁶² *Ibid.*, 70.

⁶³ *Ibid.*, 330.

attempted to solve immediate problems with the assets currently available, but he did not stop there. Seversky, like Douhet, visualized the epitome of airpower in the shape of a long-range bomber capable of self-defense. Acknowledging present engineering and aerodynamic limitations, he outlined the characteristics of such a plane: dynamic control surfaces able to compensate for battle damage, safety fuels able to resist incendiary shells, remote-controlled defensive weapons, and propeller-less engines.⁶⁴ With respect to endurance, Seversky predicted a 25,000-mile range enabling a strike at any point on earth within five years of the writing.⁶⁵ His forecasts were extreme and his timeline optimistic, but his works shaped airpower doctrine and the direction of aerospace technology for years to come.

The offensive capabilities of aviation have always been popular with airpower theorists, but Seversky was one of the first to address in detail the reciprocal threat of attack from an air-wielding enemy. For all the reasons America should attack the centers of industry of Germany and Japan, Seversky argued the Axis Powers should likewise work towards an attack against the US mainland. This, in fact was one of his greatest motivations for writing on airpower. “The rapid expansion of the range and striking power of military aviation makes it certain that the United States will be as exposed to destruction from the air, within a predictable period, as are the British Isles today.”⁶⁶ His solution is explained in the organization portion of his book where he discusses overlapping, concentric ranges of operation for different types of interceptor and pursuit airplanes.⁶⁷ Again, ahead of his time, his theories would be largely accepted and implemented in doctrine as technology advanced.

Seversky’s theories of airpower were largely unoriginal and of a propagandist nature. He built on Douhet’s principles and adapted those of Mitchell where appropriate. He included a

⁶⁴ Seversky, *Victory Through Air Power*, 312-317.

⁶⁵ Ibid., 156.

⁶⁶ Ibid., 6.

⁶⁷ Ibid., 316-319.

defensive strategy which tackled a problem earlier theorists largely wished away, but his real contribution came from a real-time analysis of aviation in World War II. Combined with his aeronautical expertise, his theories were applicable to commanders on both the European and Pacific fronts and the policymakers in Washington. Seversky's theories enjoyed the benefit of a massive war involving the richest and most industrial countries on the planet. His theories breached the gap between the theoretical application of airpower outlined in Douhet's works and the necessary employment of the capability required to defeat the Axis Powers.

The Atomic Age: Bernard Brodie

After it was apparent that World War I would not, in fact, be the war to end all wars, there was a comfort that airpower may shorten future wars. Douhet advertised the third dimension of the battlefield that enabled attacks on the vital centers themselves, striking enemy ground forces, and rendering the bloody conventional battles of World War I obsolete. When the first years of World War II repudiated this fantasy, Seversky theorized that the problem was the organization of the service and the engineering of the planes. With some minor advancement, he insisted airpower could be decisive. The three long, bloody years of conflict following the release of *Victory Through Air Power* called that into question. When the Germans and Japanese stubbornly resisted the relentless firebombing of 1945, the theories of Douhet and Seversky faced serious criticism. Many thought the vast amounts of resources committed to aviation could have achieved more decisive results if employed via conventional means.⁶⁸ Airpower was simply not as effective as advocates had promised. Target selection was far too difficult to be left to the "ability" of the commander and air defense systems were more deadly than predicted.⁶⁹ Even if the right target was identified and the bomber bypassed air defenses, the challenge of actually

⁶⁸ See, for instance, Richard Overy, *The Bombing War: Europe 1939-1945* (London: Penguin Books, 2014). Though not the focus of this monograph, Overy provides an excellent analysis on the inefficiencies of strategic bombing in World War II.

⁶⁹ Douhet, *The Command of the Air*, 60.

hitting and destroying the target remained difficult and statistically unlikely. The nuclear bomb changed this calculus.

The nuclear weapons dropped on Hiroshima and Nagasaki in 1945 demonstrated a level of destruction never previously imagined. Subsequently, the merits of Douhet's theory on airpower earned a reexamination: yes, it was possible to break the will of the people using airpower; yes, an enemy's vital centers could be destroyed using airpower; and yes, the offense was the stronger form of aerial warfare. For a time, the United States enjoyed an unparalleled military supremacy.

In 1949, when the Soviet Union acquired a nuclear capability, the abstract notion of absolute war postulated by Carl von Clausewitz shifted from the theoretical realm toward the possible.⁷⁰ With the apprehension that any conflict involving multiple nuclear powers could quickly escalate out of control, political leaders in the United States began to support a strategy of deterrence. Leading this effort was one of the prominent strategic thinkers of the time, Bernard Brodie.

Bernard Brodie was born in 1910 and earned a doctorate from the University of Chicago in 1941. He joined the US Naval Reserves as a planner and consultant for the duration of World War II while also working in academia. His primary interests included naval strategy, and he published two books, *Sea Power in the Machine Age* and *A Layman's Guide to Naval Strategy*, on the topic. Following the war, he took a job with RAND and focused his attention on airpower theory and strategy.⁷¹ His book, *Strategy in the Missile Age*, became a foundational work as the newly created US Air Force and the free world grappled with the prospect of war in the atomic age.

⁷⁰ Clausewitz, *On War*, Book One, Chapter 1.

⁷¹ Barry H. Steiner, *Bernard Brodie and the Foundations of American Nuclear Strategy* (Lawrence, KS: University Press of Kansas, 1991), 1-3.

The intercontinental ballistic missile, nuclear bomber, and submarine-launched nuclear missile characterized the military environment in which Brodie wrote. Though not what Douhet had in mind when he first theorized about airpower during World War I, the catastrophic potential of these weapons epitomized Cold War aerial warfare. Ironically, they also reversed the popular opinion of Douhet in several respects. “Since time has rescued him from his first and gravest error—his gross overestimate of physical effects per ton of bomb dropped—by introducing the nuclear bomb, Douhet’s thoughts are for any unlimited war more valid today than they were during his lifetime or during World War II,” Brodie explained.⁷²

Brodie’s intention was to develop a strategy to employ these new weapons, but what he produced turned out to be an airpower theory of his own. As with other airpower theorists, his ideas were not completely original, but rather melded the technology of the age with the strategic goals of the nation. In the atomic age, however, the stakes were higher, and for Brodie the possibility of avoiding the next war was more attractive than winning it. He believed the severity of World War I was a product of overly powerful military leaders and that World War II, with the exception of Japan, occurred due to politicians with unchecked influence. According to Brodie, “today, however, with truly cosmic forces harnessed to the machines of war, we have a situation for the first time in history where the opening event by which a great nation enters a war... can decide irretrievably whether or not it will continue to exist.” Brodie insisted that a close and cooperative relationship between the political and military leaders was essential with such high stakes.⁷³

Conventional thinking of the time allowed for three basic military options: preventative war, preemptive attack, and massive retaliation. Brodie theorized that, though less glamorous and foreign to traditional military axioms, a strategy of deterrence offered a fourth option that

⁷² Bernard Brodie, *Strategy in the Missile Age* (Princeton, NJ: Princeton University Press, 1971), 73.

⁷³ *Ibid.*, 7.

“springs from the conviction that total nuclear war is to be avoided at almost any cost.”⁷⁴ His concept of deterrence stemmed from the idea that a war of any scope between two nuclear powers could quickly escalate into a total war of total destruction. Any of the three previously mentioned options, unless executed with perfect surprise and effectiveness, which history showed to be impossible, would likely result in an unacceptable level of homeland devastation. He wrote, “We have to remember too that since the winning of a war presupposes certain limitations on the quantity of destruction to one’s own country and especially to one’s population, a win-the-war strategy could quite conceivably be an utter impossibility to a nation striking second, and is by no means guaranteed to a nation striking first.”⁷⁵ Put another way, the only path to victory in a nuclear war was to not participate.

A credible deterrence, however, was a complicated matter. Brodie outlined four considerations. First, to ensure even modest retaliation, a large force might be necessary. Second, deterrence was relative to the enemy’s motivation to go to war. This motivation may fluctuate, but the compelling force of deterrence must always be great. Third, if deterrence should fail, the offensive nuclear capability must be sufficient to conduct a successful total war. Fourth, the retaliatory force designed for deterrence must also be capable of an overwhelmingly successful first-strike against the enemy’s retaliatory capability.⁷⁶

Brodie theorized that the effectiveness of a deterrence strategy was dependent on the ability of the United States to conduct a retaliation strike. Harking back to Douhet’s argument that the best defense is a good offense, it was well understood that a nuclear capable enemy would target US nuclear weapons and delivery systems in the first volley, much like Douhet recommended attacking an enemy air force while it was still on the ground. Consequently, Brodie postulated that in addition to a powerful air force capable of an offensive strike, the US delivery

⁷⁴ Brodie, *Strategy in the Missile Age*, 268-269.

⁷⁵ Ibid., 276-277.

⁷⁶ Ibid., 277.

systems should be dispersed and protected to ensure a successful retaliation. “In any case, the overriding considerations should be that *the nation is committed to a deterrence policy* and that such a commitment dictates primary concern with the survival of a retaliatory force of adequate size following enemy attack,” he maintained.⁷⁷

Brodie addressed the differences between the two prominent nuclear delivery methods: missiles and aircraft. With regard to the retaliatory attack, consideration must be given to the delivery method’s ability to penetrate a fully alerted enemy defense—a scenario where the missile is superior. Aircraft, however, have larger payloads, they can be recalled after launch, and they can be used on search-and-destroy missions if the location of the target is not known. With both systems enjoying advantages, Brodie insisted: “The conclusion is unavoidable that for some time in the future the ideal strategic bombing force will be a mixed missile and manned-aircraft force.”⁷⁸

Brodie’s ideas on target selection for the retaliatory strikes were complicated and included several assumptions about enemy intentions. In short, he acknowledged the benefits of a heavy second strike targeting population centers, for their loss would certainly be grave enough for an enemy to resist striking in the first place, but Brodie dismissed this in favor of a less absolute option. As he put it, “a reasonable opposing view, however, is that no matter how difficult it may be to retain control of events in nuclear total war, one should never deliberately abandon control.”⁷⁹ To retain a small element of control in a terribly chaotic time, Brodie highlighted the benefits of a measured counterattack against military targets. This would allow the United States to retain the option of escalation, which could be used as a bargaining chip before the war reached a true total status.⁸⁰

⁷⁷ Brodie, *Strategy in the Missile Age*, 283.

⁷⁸ Ibid., 285-288.

⁷⁹ Ibid., 293.

⁸⁰ Ibid., 294.

When Brodie published *Strategy in the Missile Age* in the late 1950s, many scholars assumed all future wars would be nuclear, and all future wars between nuclear countries would be total. Brodie argued that wars could still be limited. He used the term deliberate restraint to characterize this behavior and speculated that these conflicts would likely be a common occurrence. For this reason, Brodie did not rule out the significance or necessity of conventional forces. Interestingly, he also did not rule out the possibility of using low-yield nuclear weapons in such limited conflicts, speculating that the fear of total war, and the exercise of deliberate restraint would keep the clashes from escalating.⁸¹

Limited Warfare: John Warden

Colonel John Warden developed his airpower theories while serving in various operational, academic, and planning positions during his thirty-year career in the US Air Force. He conceived, employed, and refined his theories in the 1980s and 90s as the service adjusted to the end of the Cold War and sought to operationalize advancements in stealth technology and precision-guided munitions.⁸² Warden's theories of warfare are highly regarded by airpower professionals today and provide a battle-tested, doctrinal foundation for air campaigns against conventional adversaries in limited conflicts.

In 1965, Warden began his career with a degree in National Security Affairs and a commission from the US Air Force Academy. After completing pilot training, he was eager to experience combat and volunteered for a tour in Vietnam flying OV-10 Broncos as a Forward Air Controller. His experiences in Southeast Asia, including 266 combat missions, fueled the critical, divergent thinking that would shape his career. Warden was jaded by the disconnect between the ineffective, graduated use of airpower in the Rolling Thunder campaign and the political aims of the conflict. A focused, concentrated use of the full capabilities of airpower, he reasoned, could

⁸¹ Brodie, *Strategy in the Missile Age*, 309-311.

⁸² John Andreas Olsen, *John Warden and the Renaissance of American Airpower* (Washington, DC: Potomac Books, 2007), 41-63.

shorten an otherwise long, costly war of attrition. As a student ten years later at the National War College, he codified his ideas in a paper entitled “The Air Campaign.”⁸³

With the support of the War College, Warden published *The Air Campaign* as a book in 1986. Interestingly, it was the first book to address air war at the operational level since World War II.⁸⁴ Written with Cold War US Air Force planners in mind, Warden warned that the United States might not always hold an advantage in manpower, technology, or production. Simply put, an overmatched air force must fly better and smarter to win.⁸⁵ Common to airpower theorists, Warden emphasized the importance of air superiority and illustrated some of the classic principles of warfare through historical examples and hypothetical scenarios.⁸⁶ New to the craft, however, were advancements in stealth technology and precision-guided munitions (PGMs), which would brand his theories. Warden foreshadowed their ability to revolutionize aerial warfare, if employed effectively.⁸⁷

Stealth was not a new idea. Though commonly understood to be a radar avoiding capability, stealth operations are actually enabled by a spectrum of low observable technologies and procedures. These include masking visible light, acoustics, infrared emissions, radio frequency emissions, and reductions in radar cross-sections. Tactics, techniques, and procedures are instrumental in detection-avoidance and, as in all of the spectrums of detection, there is a measure of stealth that can be applied to all modern aircraft. To illustrate this point, some aircraft can be painted a certain color or flown at night to make them harder to see, but it is not possible to literally make an aircraft invisible. Likewise, it is possible to design an airplane with a certain shape and coat its skin with electromagnetic absorbing material to redirect or scatter radio waves

⁸³ Olsen, *John Warden and the Renaissance of American Airpower*, 12-21.

⁸⁴ John A. Warden, Official Biography, last modified 2007, accessed July 30, 2016, [http://venturist.com/John Warden Bio 2007m.pdf](http://venturist.com/John%20Warden%20Bio%202007m.pdf).

⁸⁵ John A. Warden, *The Air Campaign: Planning For Combat* (San Jose, CA: toExcel, 1998), 116.

⁸⁶ *Ibid.*, 10-56.

⁸⁷ *Ibid.*, 34-49, 149.

from ground-based radars. As radar-avoiding technology evolves, so does radar-detecting technology. Consequently, it is not possible to eliminate an aircraft's radar cross-section. Varying the methods of employment to include flying lower, flying faster, or flying around enemy sensors and threats can compensate for any resulting limitations. The stealth hype surrounding the F-117s debut in the 1980s was such a revolution because it combined low-observable technologies from all of the spectrums with procedures that effectively allowed it to fly with a small chance of detection by the enemy. It did not enable uncontested flight over enemy territory, but it provided a situational advantage that facilitated the delivery of another revolution in airpower: PGMs.⁸⁸

PGMs, or smart bombs, are unique weapon systems in their own right. The modern arsenal of smart bombs is vast and will not be discussed at length in this monograph, but they provide a means to deliver kinetic effects to a specific geographic position. Initially, precision strikes were attempted with gravity bombs deployed with exceptionally precise bombsights. Onboard guidance systems leveraging electro-optics, laser tracking, or Global Positioning Systems (GPS) eventually surpassed this method in terms of effectiveness. GPS technology also eliminated the need for a pilot to see the target, and enabled all-weather strike capability. Regardless of the means used to ensure the munitions hit the target, they have dramatically increased the effectiveness of aerial bombardment. Warden highlighted this revolution with a comparison of the bombing techniques of World War II.

Throughout the course of World War II, the United States' mainstay bomber, the B-17, could consistently drop about half its bombs within 1,000 yards of a planned target. In practical terms, Warden explained that the destruction of a medium-sized target required the equivalent of 1,000 B-17 sorties and put 10,000 crewmembers at risk. Conversely, with the combination of stealth technology and PGMs, a single F-117 sortie using only one of its two bombs and putting

⁸⁸ Doug Richardson, *Stealth* (New York: Orion Books, 1989), 10-24.

only a single crewmember in danger could achieve the same result.⁸⁹ Clearly, strategic bombing would never be the same.

When Iraq invaded Kuwait in 1990, Warden was a senior planner at the Pentagon and put his early theories to the test. He leveraged the principles in his book to design a decisive air campaign that forced the withdrawal of the Iraqi military from Kuwait and diminished their ability to destabilize the region. Warden's campaign plan, coined Operation Instant Thunder, was based on a massive, offensive use of airpower to paralyze the Iraqi regime and its leadership. Rather than supporting ground forces like the conventional AirLand Battle doctrine of the time, Operation Instant Thunder advocated a short-notice air campaign that could be executed independent of ground forces and that was strategic in nature. It was based on what Warden called the "Five Ring Model" and focused on effects-based strikes targeting strategic centers of gravity as opposed to fielded enemy forces.⁹⁰

The commander of US Central Command (CENTCOM), General Norman Schwarzkopf, approved the overall concept of the operation and directed Warden to continue planning in the event an air option was selected.⁹¹ In hindsight, Schwarzkopf's preference was to use airpower to support a lengthy deployment of coalition forces and a massive ground invasion.⁹² Schwarzkopf was uncomfortable with the prospect of an air campaign that focused on strategic targets but left the enemy forces largely intact and capable of future aggression. Ultimately, many aspects of Operation Instant Thunder were incorporated into Operation Desert Storm and the successes of airpower were well documented, but Warden judged airpower was capable of much more.⁹³ Warden believed airpower by itself had the potential to be decisive in battle, and "The Enemy as

⁸⁹ Warden, *The Air Campaign*, 147-149.

⁹⁰ Olsen, *John Warden and the Renaissance of American Airpower*, 145-150.

⁹¹ Ibid., 158.

⁹² Warden, *The Air Campaign*, 146.

⁹³ Olsen, *John Warden and the Renaissance of American Airpower*, 218.

a System,” published in 1995, explained this theory using the Five Ring Model used to construct the original Instant Thunder campaign.⁹⁴

Warden’s five ring theory built on the principles of *The Air Campaign* by comparing the enemy to a human body to demonstrate the interconnected nature of an adversary’s different centers of gravity.⁹⁵ Warden illustrated this concept with an illustration composed of five-concentric rings. Each ring represented an essential component or system within the overarching system, much like an organ in a body. The center ring denoted the enemy’s leadership, and subsequent rings comprised organic essentials, infrastructure, population, and fielded military.⁹⁶ Enemies, systems, and bodies are all different, and Warden offered his model as “a good starting point. It tells us what detailed questions to ask, and it suggests a priority for the questions...”⁹⁷ The underlying principle is enduring, however: all rings represent interconnected systems that, if attacked simultaneously, would debilitate an adversary. If interpreted as a map, the five-ring model helps illuminate a unique benefit of air power: the fielded military did not need to be destroyed to ensure victory.⁹⁸

Historically, militaries targeted enemy fielded forces early in a conflict because they protected a nation’s territory, infrastructure, resources, leadership, and so forth.⁹⁹ With the application of stealth technology and PGMs, the commander’s targeting options expanded. Warden asserted that coordinated attacks on centers of gravity in all rings created more chaos and

⁹⁴ John A. Warden, “The Enemy as a System,” *Airpower Journal* 9, no. 1 (Spring 1995): 44, accessed September 30, 2016, http://www.au.af.mil/au/afri/asbj/airchronicles/apj/apj95/spr95_files/warden.htm.

⁹⁵ Ibid.

⁹⁶ Ibid.

⁹⁷ Ibid.

⁹⁸ Clayton K. S. Chun, “John Warden’s Five Ring Model and the Indirect Approach to War,” in *US Army War College Guide to National Security Policy & Strategy*, ed. J. Boone Bartholomees, Jr. (Washington, DC: Strategic Studies Institute, 2006), 361-372, accessed September 22, 2016, <http://www.strategicstudiesinstitute.army.mil/pdffiles/PUB708.pdf>.

⁹⁹ Warden, “The Enemy as a System,” 44.

destruction than a land-based clash of forces moving from the outer ring inward.¹⁰⁰ Warden's relevancy and acceptance today is evident in several US Air Force Doctrine Documents, including Annex 3-0, *Operations and Planning*, where doctrine writers endorsed his five-ring model, named "Warden's Rings," as a technique for analyzing complex systems.¹⁰¹

Unfortunately, the usefulness of Warden's theory breaks down when applied to non-state actors and asymmetric warfare. Religious extremists, for example, do not rely on linear leadership models to the same degree as a national military. Lone wolf attacks are increasingly common in western states, orchestrated by ideologies, not chains of command.¹⁰² Likewise, infrastructure and resources used by international terrorist organizations are also difficult to target with airpower without disrupting the population or sovereignty of the foreign state.¹⁰³

Lawrence Freedman, a notable author on military strategy, wrote about the disadvantages of asymmetric warfare involving military superpowers in his book, *Strategy*. According to Freedman, "...stronger military powers had a natural preference for decisive battlefield victories, [but] the weaker were more ready to draw the civilian sphere into the conflict while avoiding open battle."¹⁰⁴ Freedman offers a variety of measures weaker nations could take to combat the strong ranging from a focus on imposing pain over winning battles to targeting the enemy's domestic political base. In other words, the resiliency of a cause may prove to be more formidable than the operational effectiveness of PGMs. Nonetheless, Colonel Warden is one of the most renowned airpower theorists of the modern age, and his theories have shaped the use of airpower in recent conflicts.

¹⁰⁰ Warden, "The Enemy as a System," 44.

¹⁰¹ Air Force Doctrine Annex 3-0, *Operations and Planning* (Washington, DC: Government Printing Office, 2012), 128.

¹⁰² Lydia Alfaro-Gonzalez et al., *Report: Lone Wolf Terrorism* (Washington, DC: Security Studies Program, 2015), accessed September 10, 2016, <http://georgetownsecuritystudiesreview.org/wp-content/uploads/2015/08/NCITF-Final-Paper.pdf>.

¹⁰³ Tal Becker, *Terrorism and the State: Rethinking the Rules of State Responsibility* (London: Bloomsbury Publishing, 2006), 228.

¹⁰⁴ Lawrence Freedman, *Strategy* (New York, NY: Oxford University Press, 2013), 220.

Contemporary Airpower Theory: Operation Enduring Freedom

Contemporary airpower theory remains fluid and nebulous, but there are several enduring characteristics. Colonel Jeffrey Smith, former dean of the US Air Force School of Advanced Air and Space Studies, characterizes modern airpower theory with the axioms of access, speed, strategic strike, and decisiveness. According to Smith, access refers to airpower's ability to "bypass and overfly the traditional strengths of an enemy's ground forces and target those areas the belligerent held dear."¹⁰⁵ Speed is inherent in any employment of airpower when compared to traditional ground forces and enables the strategic strike referred to by airpower theorists from Douhet to Warden. Likewise, strategic strike represents a common thread of airpower theory reaching back to Douhet's emphasis on attacking "vital centers." Decisiveness, according to Smith, was added to airpower theory by the Air Corps Tactical School prior to World War II, leading to "development of a strategy that further reified how and why airpower would be used to meet the strategic ends of military advantage and ultimately victory."¹⁰⁶

Smith asserts that these characteristics of airpower theory are enduring and never-changing. The historical analysis undertaken during the research for this monograph loosely supports that assertion, but a more useful final analysis lies in the study of a recent conflict using the lenses of access, speed, strategic strike, and decisiveness. Again, to quote Kenneth Waltz, "Success in explaining, not in predicting, is the ultimate criterion of good theory."¹⁰⁷ The air war in Afghanistan following the terrorist attacks of 11 September 2001 will serve as the case study to evaluate Smith's synopsis of airpower theory.

Operation Enduring Freedom (OEF) began less than a month after the 11 September 2001 attacks as an offensive mission designed to eliminate Osama bin Laden and al-Qaeda, and

¹⁰⁵ Smith, "Beyond the Horizon," 75.

¹⁰⁶ Ibid., 76.

¹⁰⁷ Waltz, "Evaluating Theories," 916.

dislodge the Taliban regime known for harboring international terrorists and criminals.¹⁰⁸ Amid tremendous public support, the United States retaliated militarily against those responsible for the terrorist attacks, relying extensively on Special Operations Forces (SOF) and aviation assets. US CENTCOM devised a four-phased plan aimed to set conditions and build forces, conduct initial combat operations, conduct decisive combat operations, and establish capability to prevent the reemergence of terrorism.¹⁰⁹ By early 2002, the US Air Force was fully engaged in Afghanistan. As a 2009 study from the Mitchell Institute put it, “From airlift to fire support to ISR activities, the full abilities of modern airpower have been brought to bear.”¹¹⁰

The Taliban government was targeted as a sponsor of al-Qaeda, but their destruction was not the only objective of OEF. General Tommy Franks, US CENTCOM Commander, understood just days after the terrorist attacks in New York and Washington, DC that the military campaign he was about to oversee would have two objectives: remove the Taliban government from power and destroy al-Qaeda in Afghanistan.¹¹¹

The initial campaign to destroy al-Qaeda was initially led by Operational Detachment-Alphas (ODAs) comprised of SOF troops. The ODAs were inserted into northern Afghanistan to partner with local Taliban resistance, the Northern Alliance. US Air Force Joint Terminal Attack Controllers (JTACs) imbedded with the ODAs were responsible for coordinating all close air support missions and brought lethal amounts of firepower to bear against the enemy.¹¹² Reinforcing the airpower theory of access, speed, strategic strike, and decisiveness, the coalition’s strategic objectives of phases one and two were handily achieved: “Major cities, long held by

¹⁰⁸ Donald Wright, *A Different Kind of War: The United States Army in Operation ENDURING FREEDOM October 2001-September 2005* (Fort Leavenworth, KS: Combat Studies Institute Press, 2010), 27.

¹⁰⁹ Ibid., 46.

¹¹⁰ Rebecca Grant, *Airpower in Afghanistan: How a Faraway War is Remaking the Air Force* (Arlington, VA: Mitchell Institute, 2009), 3, accessed October 2, 2016, <https://secure.afa.org/Mitchell/Reports/0209airpowerinafghan.pdf>.

¹¹¹ Wright, *A Different Kind of War*, 30, 41.

¹¹² Ibid., 73-77.

Taliban forces, in short order began to fall like dominoes.”¹¹³ The landlocked and remote geography of Afghanistan made the axiom of access instrumental, particularly early in the campaign. Speed enabled the execution of the first air strikes on 7 October 2001, just 25 days after the New York City and Washington, DC terrorist attacks. Likewise, strategic strike was employed using B-2, B-52 and B-1 bombers with attacks on 31 targets that first night. According to the US Air Force Historical Studies Office, “The use of airpower in the campaign to capture Mazar-e-Sharif was considered a major breakthrough in the struggle to oust the Taliban and al-Qaeda.”¹¹⁴ The coordinated airstrikes in support of the Northern Alliance shaped the outcome of that battle and others.

As part of the multidimensional campaign in Afghanistan, the US Air Force also conducted a massive humanitarian airlift operation. The initial \$320 million humanitarian aid package for Afghanistan enabled the US Air Force to drop 37,000 rations a day at the onset of offensive operations. The significance was captured by Michael O'Hanlon, a senior fellow at the Brookings Institution, who said “I wouldn't be surprised if it was first time in military history that an attacker delivered humanitarian relief on the very first day of going to war.”¹¹⁵ US CENTCOM planners considered gaining and retaining the support of the local population to be a crucial aspect of the campaign, and the humanitarian airlift operations, in conjunction with the efforts of non-governmental organizations, was a necessary component to long-term stability.¹¹⁶

In terms of kinetic effects, the contemporary employment of airpower appeared to be decisive. Just 102 days after the attacks of 11 September 2001, the coalition completed the formal

¹¹³ Grant, *Airpower in Afghanistan*, 6.

¹¹⁴ Gregory Ball, “Operation Enduring Freedom: Fact Sheet,” US Air Force Historical Studies Office, last modified September 17, 2014, accessed January 31, 2017, <http://www.afhistory.af.mil/FAQs/FactSheets/tabid/3323/Article/458975/operation-enduring-freedom.aspx>.

¹¹⁵ Ellen Gamerman, “As Bombs Fall, So Does Food Aid,” *The Baltimore Sun*, modified October 9, 2001, accessed December 20, 2016, http://articles.baltimoresun.com/2001-10-09/news/0110090402_1_humanitarian-aid-aid-to-afghanistan-food-drops.

¹¹⁶ Wright, *A Different Kind of War*, 28.

overthrow of the Taliban regime and the bombing came to a halt. By early 2002, coalition forces shifted efforts to protect the newly-formed Afghan government, and the entire operation was looking like a quick, decisive success.¹¹⁷

By any measure, the Taliban military was overmatched. Their army consisted of approximately 45,000 poorly-trained and equipped troops, they had only a marginal collection of one hundred obsolete Soviet tanks and eighty helicopters, and their air defense forces consisted of fewer than fifty MiG-21 and Su-22 fighters and a handful of surface-to-air missile systems. Coalition forces achieved air superiority in a matter of minutes and air supremacy in a matter of days. The Taliban were unable to launch a single aircraft against the coalition.¹¹⁸ Within a few months, however, the end was far from in sight, and fifteen years later, nearly 10,000 US military troops still remain in country, suggesting that coalition airpower was anything but decisive in limited, unconventional wars fought to achieve limited policy objectives.

Conclusion

In many ways, airpower proved effective during the early phases of OEF. The US Air Force had the assets, resources, and public support to select and attack targets with an exceedingly high level of precision. Coalition forces flew sorties, destroyed targets, and achieved objectives, but the will of the Taliban and Al-Qaida fighters to resist was unbroken. OEF substantiated three of the four the tenets of modern airpower theory: access, speed, strategic strike; decisiveness remained elusive. Is that the fault of modern airpower theory, or is it something different entirely?

¹¹⁷ Benjamin S. Lambeth, *Air Power Against Terror: America's Conduct of Operation Enduring Freedom*, (Santa Monica, CA: RAND, 2005), xx, accessed October 12, 2016, http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG166-1.pdf.

¹¹⁸ Ibid, 85-88.

Waltz's test of a theory hinges on "explaining, not predicting." He cautions, however, that testing theories is "uncertain business."¹¹⁹ Evaluating a theory by explaining the past comes with two challenges. First, it is necessary to understand the theory. Colonel Smith's understanding of contemporary airpower theory seems simple and adequate, but it is still just one perspective, albeit a very credible one. Second, it is necessary to understand the reality of which the theory is tested against. To quote Waltz, "Evaluating a theory requires working back and forth between the implications of the theory and an uncertain state of affairs that we take to be the reality against which the theory is tested."¹²⁰ While airpower theory is open to interpretation, so is the role and success of airpower in Operation Enduring Freedom.

Airpower theory is not decidedly invalid, but the situational application of airpower could probably benefit from further analysis. The United States invests heavily in its military—the Air Force in particular—but the military instrument of power is not always the best tool. To quote psychologist Dr. Abraham H. Maslow and his relevant but possibly overused golden hammer concept, "I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail."¹²¹ In many ways, that is how the United States uses its Air Force. While the theoretical employment reaching back in history to Giulio Douhet is sound, the decisiveness of modern airpower still seems to fall short in conflicts against other than conventional militaries.

The Vietnam War generated similar feelings amongst airpower leaders. Following the implementation of Warden's Five Ring Model and the US Air Force's success in the Gulf War, however, airpower advocates had renewed hope of the ability for aviation to carry the day in future conflicts. Unfortunately, as Operation Enduring Freedom evolved into a large-scale military operation against a small-scale enemy, shortfalls in the employment of airpower became evident. Several years of hindsight help to clarify the situation, but it seems safe to say at this

¹¹⁹ Waltz, "Evaluating Theories," 916.

¹²⁰ Ibid.

¹²¹ Abraham H. Maslow, *The Psychology of Science* (New York: Joanna Colter Books, 1966), 15.

point that the use of airpower in Afghanistan did not fully meet the expectations of US military leaders. Modern airpower theory is rooted in the paradigm of big, conventional conflicts fought for unlimited national aims, and the Middle East conflicts of the past fifteen years highlight a blind spot.

Compared to the US Air Force, a more fundamentally different enemy than Al Qaida would be hard to imagine. The US Air Force maneuvers into the battlespace at forty thousand feet, armed with satellite-guided munitions, and cloaked in radar-absorbing material. Al Qaida walks through an airport in civilian clothes, armed with a box knife and a couple hours of flight instruction. Giulio Douhet likely would not know what to make of this sort of adversary. If the United States expects to use airpower against terrorists, insurgencies, or guerrilla combatives, a substantial evolution of airpower theory seems to be in order. Alternatively, perhaps airpower should relinquish its contemporary place at the head of the line of military options on the sliding scale of military conflict?

Bibliography

- Air Force Doctrine Annex 3-0, *Operations and Planning*. Washington, DC: Government Printing Office, 2012.
- Alexander, John. "Air Power in Countering Irregular Warfare." *Military Technology* (June 2009): 99-106.
- Ball, Gregory. "Operation Enduring Freedom: Fact Sheet." Air Force Historical Studies Office. Last modified September 17, 2014. Accessed October 25 2016. <http://www.afhso.af.mil/topics/factsheets/factsheet.asp?id=18634>.
- Becker, Tal. *Terrorism and the State: Rethinking the Rules of State Responsibility*. London: Bloomsbury Publishing, 2006.
- Biddle, Tami Davis, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914-1945*. Princeton, NJ: Princeton University Press, 2004.
- Bousquet, Antoine. *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity*. New York: Columbia University Press, 2009.
- Brodie, Bernard. *Strategy in the Missile Age*. Princeton, NJ: Princeton University Press, 1971.
- Builder, Carl. *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force*. New Brunswick, NJ: Transaction Publishers, 2003.
- Call, Steve. *Danger Close: Tactical Air Controllers in Afghanistan and Iraq*. College Station, TX: Texas A&M University Press, 2007.
- Carr, Anthony B. *America's Conditional Advantage: Airpower, Counterinsurgency, and the Theory of John Warden*. Maxwell Air Force Base, AL: Air University Press, 2009.
- Chun, Clayton. "John Warden's Five Ring Model and the Indirect Approach to War." In *US Army War College Guide to National Security Policy & Strategy*, edited by J. Boone Bartholomees, 361-372. Washington, DC: Strategic Studies Institute, 2006. Accessed September 22, 2016, <http://www.strategicstudiesinstitute.army.mil/pdf/PUB708.pdf>.
- Clausewitz, Carl von. *On War*. Edited and translated by Michael Howard and Peter Paret. Princeton, NJ: Princeton University Press, 1984.
- Clodfelter, Mark. *The Limits of Air Power: The American Bombing of North Vietnam*. Lincoln, NE: University of Nebraska Press, 2006.
- Corbett, Julian. *Some Principles of Maritime Strategy*. Annapolis, MD: Naval Institute Press, 1988.
- Corum, James. *The Luftwaffe: Creating the Operational Air War, 1918-1940*. Lawrence, KS: University Press of Kansas, 1997.
- Dean, David. *The Air Force Role in Low-Intensity Conflict*. Maxwell Air Force Base, AL: Air University Press, 1986.
- Dolman, Everett Carl. *Pure Strategy: Power and Principle in the Space and Information Age*. New York, NY: Frank Cass, 2005.
- Douhet, Giulio. *The Command of the Air*. 2nd ed. Translated by Dino Ferrari. New York, NY: Coward-McCann, 1942.

- Eisenhower, John. *Intervention: The United States and the Mexican Revolution, 1913-1917*. New York, NY: W.W. Norton & Company, 1993.
- Fadok, David. *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*. Maxwell Air Force Base, AL: Air University Press, 1995.
- Freedman, Lawrence. *Strategy*. New York, NY: Oxford University Press, 2013.
- Fuller, J. F. C. *The Foundations of the Science of War*. London: Hutchinson, 1926.
- Grant, Rebecca. *Airpower in Afghanistan: How a Faraway War is Remaking the Air Force*. Arlington, VA: The Mitchell Institute, 2009. Accessed October 2, 2016, <https://secure.afa.org/Mitchell/Reports/0209airpowerinafghan.pdf>.
- Gray, Colin. *The Airpower Advantage in Future Warfare: The Need for Strategy*. Maxwell Air Force Base, AL: Airpower Research Institute, 2007.
- Hammond, Grant. *The Mind of War: John Boyd and American Security*. Washington, DC: Smithsonian Institution Press, 2001.
- Joint Publication 3-0, *Joint Operations*. Washington, DC: Government Printing Office, 2011.
- Kuhn, Thomas. *The Structure of Scientific Revolutions*. Chicago, IL: University of Chicago Press, 1996.
- Lambeth, Benjamin. *Air Power Against Terror: America's Conduct of Operation Enduring Freedom*. Santa Monica, CA: RAND, 2005. Accessed October 12, 2016, http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG166-1.pdf.
- _____. *The Transformation of American Air Power*. Ithaca, NY: Cornell University Press, 2000.
- MacIsaac, David. "Voices from the Central Blue: The Air Power Theorists." In *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, edited by Peter Paret, 624-647. Princeton, NJ: Princeton University Press, 1986.
- Maslow, Abraham. *The Psychology of Science*. New York, NY: Joanna Colter Books, 1966.
- Meilinger, Phillip. *Airwar: Theory and Practice*. Edited by Sebastian Cox. London: Frank Cass Publishers, 2003.
- _____. "Giulio Douhet and the Origins of Airpower Theory." In *The Paths of Heaven: The Evolution of Airpower Theory*, edited by Phillip Meilinger. Maxwell Air Force Base, AL: Air University Press, 1997.
- _____. "Proselytiser and Prophet: Alexander P. de Seversky and American Airpower." In *Airpower: Theory and Practice*, edited by John Gooch. London: Frank Cass & Co Ltd, 1995.
- Mets, David. *The Air Campaign: John Warden and the Classical Airpower Theorists*. Maxwell Air Force Base, AL: Air University Press, 1999.
- Mitchell, William. *Winged Defense: The Development and Possibilities of Modern Air Power Economic and Military*. Mineola, NY: Dover Publications, 2006.
- Olsen, John. *A History of Air Warfare*. Dulles, VA: Potomac Books, 2010.
- _____. *John Warden and the Renaissance of American Air Power*. Dulles, VA: Potomac Books, 2007.

- Osinga, Frans. *Science, Strategy, and War: The Strategic Theory of John Boyd*. London: Routledge, 2007.
- Pape, Robert. *Bombing to Win: Air Power and Coercion in War*. Ithaca, NY: Cornell University Press, 1996.
- Parks, W. Hays. "'Precision' and 'Area' Bombing: Who Did Which, and When?" In *Airpower: Theory and Practice*, edited by John Gooch. London: Frank Cass & Co Ltd, 1995.
- Pearce, Perce, dir. *Victory Through Air Power*. Walt Disney Films, 1943. Online. YouTube, 2014.
- Read, Derek. "Airpower in COIN: Can Airpower Make a Significant Contribution to Counter Insurgency?" *Defence Studies* (March 2010): 126-151.
- Reynolds, Richard. *Heart of the Storm: The Genesis of the Air Campaign Against Iraq*. Maxwell Air Force Base, AL: Air University Press, 1995.
- Richardson, Doug. *Stealth*. New York, NY: Orion Books, 1989.
- Rosenau, James. *The Scientific Study of Foreign Policy*. London: Frances Pinter, 1980.
- Seversky, Alexander. *Victory Through Air Power*. New York, NY: Simon and Schuster, 1942.
- Slessor, John. *Air Power and Armies*. London: Oxford University Press, 1936.
- Smith, Jeffrey. "Beyond the Horizon." *Strategic Studies Quarterly* 8, no. 2 (Summer 2014): 74-95.
- Steiner, Barry. *Bernard Brodie and the Foundations of American Nuclear Strategy*. Lawrence, KS: University Press of Kansas, 1991.
- Vallance, Andrew. *The Air Weapon: Doctrines of Air Power Strategy and Operational Art*. New York, NY: St. Martin's Press, 1996.
- Waltz, Kenneth. "Evaluating Theories." *American Political Science Review* 91, no. 4 (December 1997): 913-7.
- Warden, John. *The Air Campaign: Planning For Combat*. San Jose, CA: toExcel, 2000.
- _____. "The Enemy As a System." *Air Power Journal* 9, no. 1 (Spring 1995): 40-55.
- Accessed September 30, 2016,
http://www.au.af.mil/au/afri/asbj/airchronicles/apj/apj95/spr95_files/warden.htm.